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Chapter 2
Harnessing Knowledge Power for Competitive Advantage

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ABSTRACT

A great many organizations rely upon advancing Information Technology (IT) in their quests for competitive advantage. The problem is that as long as competitive advantage is based on IT and like resources that are obtainable or substitutable by competing organizations, it is likely to be ephemeral at best. Alternatively, competitive advantage enabled by tacit knowledge is comparatively much more sustainable, but such knowledge tends to be sticky and does not flow well through the organization. Hence, the power of tacit knowledge is great in terms of enabling and particularly sustaining competitive advantage, but the corresponding dynamics can make it difficult to capitalize upon effectively. This chapter focuses specifically on how the power of dynamic knowledge (i.e., knowledge flows) can be harnessed for competitive advantage. The authors first examine in some detail how different kinds of knowledge and other organizational resources enable competitive advantage. They then discuss the dynamics of knowledge, looking in particular at how it flows through the organization. The chapter concludes with five key insights for use and application.

COMPETITIVE ADVANTAGE

It is difficult to find an organization that is *not* interested in competitive advantage in today's dynamic, global, highly competitive environment (Matusik & Hill, 1998; Chaharbaghi & Lynch, 1999; Barney, 2002; Fahey, 2002; Teece, 2009). Organizational strategists have long discussed competitive advantage (esp. in economic terms such as earning superior rents, gaining larger market share, raising barriers to market entry, locking out competitors, and locking in customers; see Barney, 1986), but the comparatively recent advent and continuing proliferation of social media applications (e.g., social networking such as Facebook, microblogging such as Twitter, collaborative projects such as Wikis; see Kaplan & Haenlein, 2010) is changing the nature of competition (Nissen & Bergin, 2013). Nonetheless, numerous empirical studies assess (Castillo, 2003) and provide evidence (Darroch, 2005; Marques & Simon, 2006; Bogner & Bansal, 2007; Holsapple & Jones, 2007; Zack, McKeen & Singh, 2009; Holsapple & Wu, 2011; Jayasingam,

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Ansari, Ramayah & Jantan, 2012; Nold, 2012) that competitive advantage stems from the intellectual and other assets that an organization is able to appropriate (i.e., assert ownership over), in addition to how such assets are used (Holsapple & Singh, 2001) and the process capabilities that it is able to employ dynamically (Teece, Pisano & Shuen, 1997). The latter part of this point is key: if an organization bases its competitive advantage on some assets that can be obtained readily through the market, then there is little to prevent competitors from obtaining the same or similar ones over time (Dierickx & Cool, 1989). Hence any competitive advantage effected by the lead firm is destined to be ephemeral at best.

This is the case especially for information technology (Nissen, 2006). For a period of time in the Seventies, for instance, a few banks offering automated teller machines (ATMs) to customers enjoyed some competitive advantages over those without this technology, but today nearly every bank offers ATMs. Instead of conferring some competitive advantage, now ATM technology represents just another cost of doing business in banking. Computerized reservation systems (CRSs), as another instance, similarly conferred some competitive advantage to the pioneering airlines behind their development and initial deployment in the Eighties, but today nearly every airline uses CRSs. Instead of conferring some competitive advantage, now CRS technology represents just another cost of doing business in air travel. Leading-edge financial investment firms, as a third instance, gained some competitive advantage in the Nineties through computer trading systems for securities such as stocks, bonds and futures, but today nearly every financial investment firm trades securities as such. Instead of conferring some competitive advantage, now this information technology represents just another cost of doing business in securities financial investment. The list of similar instances goes on and continues through cloud computing, mobile applications, tablets, social media and like trends that are current at the time of this writing.

The same applies also to other primary resources such as the traditional economic inputs of land, labor and capital. For instance, in terms of land, for centuries the vineyards of France enjoyed considerable competitive advantage over wine producers in other regions. However, world-class, award-winning wines are produced today in California, South America, Australia and other regions. Fine wines are produced still in France of course, but the land alone is no longer sufficient for competitive advantage over vintners in other fertile regions of the world. As another instance, in terms of labor, for decades following World War II the relatively low cost and high quality of Japanese workers conferred considerable competitive advantage across numerous durable-goods and consumer-electronics industries (e.g., machinery, automobiles, televisions, radios). Then labor-based advantages shifted to places like South Korea, Malaysia, Mexico and other nations. Today China appears to be capitalizing best on the basis of labor. Japanese firms remain competitive still in markets for some goods, electronics and other products, but the labor force alone is no longer sufficient to confer competitive advantage over manufacturers in other industrializing nations. Such shifting of labor-based advantage is clearly not limited to manufacturing industries. A huge number of IT and service jobs, for two contemporary instances, have moved from Europe and North America to India, Singapore and like countries with relatively well-educated, low-cost work forces possessing technical skills. However, as educational levels and technical skills continue to rise in other countries, India, Singapore and like nations enjoying labor-based competitive advantage today are likely to find such advantage cannot be sustained through the onset of new competitors. As a third instance, in terms of capital, for centuries the days of gold coins and later even paper money restricted financial flows to relatively small geographical regions. Regional concentrations formed where large banks, industries and markets coalesced together, and such regions enjoyed competitive advantage

over others that lacked equivalent coalescence. Alternatively, capital can flow all around the world in seconds today. Global commerce no longer requires regional interactions between business people. Regional capital concentrations in places such as New York, London and Tokyo persist still of course, but the capital concentrated there is no longer sufficient for competitive advantage over other capitalists distributed worldwide. Only if an organization is able to combine, integrate and apply its resources (e.g., land, labor, capital, IT) in an effective manner that is not readily imitable by competitors can such organization enjoy competitive advantage that is sustainable over time.

In a knowledge-based theory of the firm, this idea is extended to view organizational knowledge as an asset with at least the same level of power and importance as the traditional economic inputs (Drucker, 1995; Grant, 1996; Spender, 1996). An organization with superior knowledge can achieve competitive advantage in markets that appreciate the application of such knowledge. Semiconductors, genetic engineering, pharmaceuticals, software, military warfare and similar knowledge-intensive competitive arenas provide both time-proven and current examples. Consider semiconductors (e.g., computer chips), which are made principally of sand and common metals. These ubiquitous and powerful electronic devices are designed within common office buildings, using commercially available tools, and are fabricated within factories in many industrialized nations. Hence land is not the key competitive resource in the semiconductor industry. Likewise, people with training and experience in semiconductor design and fabrication are available throughout the world. Hence neither is labor the key competitive resource in this industry. Similarly, even though semiconductor fabrication plants must be custom-designed, require over a billion dollars to build, and become obsolete within a year or few, a great many nations and large corporations can afford to construct such expensive plants. Hence capital fails to qualify too as the key competitive resource here. Yet one semiconductor firm is hugely successful in financial terms such as earnings and market share. This firm *knows* how to design, fabricate and market semiconductors better than its competitors do. Hence knowledge is the key competitive resource in the semiconductor industry. This knowledge-based competitive advantage has been sustained for several decades now. Similar examples concerning computer operating systems software, networking equipment, Internet search and other knowledge-based products serve to reinforce this point.

Two competitors can possess exactly the same kinds of land, labor, capital and IT, but differ in terms of how such assets are combined in the organization, integrated through work processes, and applied to develop products and services. The one with better knowledge can win, consistently and through time. Consider military combat (e.g., naval warfare), the history of which is replete with examples of "inferior" forces (e.g., in terms of land, labor, capital and technology) winning battles and even wars. For instance, recall the colorful era of wooden sailing ships with fixed rows of cannons along their sides. The outcomes of naval battles in this era were predictable generally on the basis of: a) number of ships in a fleet, and b) number and size of cannons onboard ships. The countries whose land, labor, capital and technology could produce fleets in greater numbers than those of adversaries fared well consistently in battles at sea.

However, such battles were fought commonly through broadside cannon exchanges between ships from opposing fleets sailing past one another in long, straight lines. "Crossing the T" (i.e., sailing perpendicular to the line of ships from an opposing fleet) represented a *tactic* (i.e., a set of actions based upon knowledge) that could confer competitive advantage even to a smaller fleet of lesser-equipped ships (e.g., consider the Battle of Trafalgar). Because ships of the day had difficulty shooting forward, the "crossing" fleet faced comparatively little cannon fire. Further, because cannons were relatively inaccurate in those days,

the "crossing" fleet also had a long line of opposing ships to target lengthwise, whereas the fleet shooting broadside had comparatively small targets as ships pitched, rolled and sailed on the high seas. Here tactical knowledge conferred competitive advantage even to fleets lacking the materiel advantage based upon traditional resources of land, labor, capital and technology. In our current era of networked sensors, weapons (Alberts, Garstka & Stein, 1999) and Cyberspace capabilities (Clarke & Knake, 2010; Kramer, Starr & Wentz, 2011), knowledge remains a key competitive resource in military combat.

Even when leveraging knowledge for competitive advantage, however, organizations can suffer the same limitations in terms of sustainability. As with the assets above, for instance, where a competitor can obtain the same kind of knowledge and apply it just as well, then any competitive advantage that may obtain (e.g., via first-mover advantages) is unlikely to be sustainable. Information—and knowledge made explicit—falls generally into this category. When an organization attempts to take advantage of such information or explicit knowledge, it is required to protect it vigilantly or risk losing any advantage that it enables. This is the fundamental motivation for keeping secrets (e.g., military, trade, stock picking) and underlies laws for patent and copyright protection in many countries, as well as espionage and organized intelligence collection. Thus, not all knowledge offers equal potential in terms of competitive advantage. Speaking generally, the more explicit that knowledge becomes, the lower its competitive potential becomes (Saviotti, 1998).

Alternatively, tacit knowledge, particularly knowledge that is specific to a particular person, organization, market or domain, is not as susceptible to loss. Gained principally through experience and accumulated over time, personal and organizational capabilities based upon tacit knowledge are difficult to imitate, even if observed directly by competitors. Consider a virtuoso violinist, for instance, auditioning for a lead role with a symphony orchestra; a competing violinist (e.g., auditioning for the same lead role) can watch every stroke made and note played by the virtuoso, but this does not imply that he or she will be able to achieve comparable virtuosity simply through observation. The same kind of competitive advantage applies to experienced contract negotiators, aviators, golfers, chess players, parents, politicians and many other people whose performance is based principally upon experience-based tacit knowledge.

Likewise with organizational tacit knowledge, which manifests itself through organizational cultures, routines and procedures; simply observing a high-performance organization—say with considerable experience in a particular product or service market—does not necessarily confer comparable capability to a competitor. This is one driver of first-mover competitive advantage, and it helps to explain why it can be so very difficult for second-mover firms to ever catch up.

Contrast such knowledge-based competitive advantage to activities predicated upon keeping explicit knowledge secret; were someone to view the secret recipe for making a soft drink, to discover the top secret keys used to encrypt military communications, to uncover a security trading firm's explicit trade algorithms, or achieve like access to explicit knowledge used to enable competitive advantage, for several instances, then one would not expect for such advantage to be sustainable for long.

Hence relatively inimitable knowledge-based competitive advantage can obtain and be sustained readily on the basis of tacit knowledge, but such advantage is more difficult when predicated upon knowledge in explicit form. Speaking generally, tacit knowledge offers greater promise in terms of competitive advantage than explicit knowledge does due to its greater inimitability. Such inimitability represents a proverbial two-edge sword, however. Even in situations of planned technology transfer between different units of a single firm, for instance, in which management *encourages*

knowledge to flow, such transfers are consistently problematic (Szulanski, 1996). The tacit knowledge is "sticky" (von Hippel, 1994), clumps in the transferring experts and units (Nissen, 2006), and does not flow freely (O'Dell, Ostro & Grayson, 1998). Further, even where substantial knowledge has been made explicit (e.g., through engineering drawings, standard procedures, lessons learned), in many cases it is not sufficient to write down the work steps and to expect people in different offices, plants, companies or regions to perform at comparable levels (Szulanski & Winter, 2002). We know more than we can tell (Polanyi, 1966).

For instance at the organizational level, despite overt help and cooperation from Toyota, advantages stemming from producing low cost, high quality automobiles via the Toyota Production System have been elusive for numerous other companies attempting to replicate Toyota's success. As another instance, the US Government has encountered similar experiences. Many large contracts to produce major weapon systems (e.g., airplanes, missiles) have required defense firms to provide detailed engineering drawings, manufacturing assembly plans and production tools to enable competing firms to build the same systems. The rationale was to introduce a modicum of competition in the defense procurement process. However, "second sources," as they are called, are able rarely to compete on a head-to-head basis. Even after being forced to share abundant explicit knowledge, the lead firm retains its knowledge-based competitive advantage. Tacit knowledge, which resists articulation and transfer, accounts in great part for this phenomenon.

Organizations that develop tacit knowledge—at the individual level as well as across groups, teams and organization-wide—enjoy much greater power of appropriation and lower risk of imitation than organizations relying upon traditional assets do. This depends of course on the organization's ability to keep its knowledge-laden people and teams from defecting to competitors. Further, an organization's level of current knowledge enhances its ability to learn new knowledge. The further behind one organization gets with respect to its competitors in terms of knowledge, the more difficult it becomes to catch up. Notice this represents a dynamic phenomenon. Not only is the *inventory* (i.e., knowledge level) important to enable competitive advantage, but also the *learning rate* (i.e., knowledge flow) is critical to sustaining any such advantage that may obtain. The more you know, the faster you learn. This maxim applies to organizations as well as to individuals (Cohen & Levinthal, 1990).

KNOWLEDGE FLOWS

Drawing heavily from Nissen (2006), here we discuss the dynamics of knowledge flows. Like mineral deposits that are rich in some geographical regions and sparse in others, knowledge is not distributed evenly throughout the world or across organizations. Different organizations possess different kinds and levels of knowledge, and we note above how differential knowledge between organizations can establish a basis for competitive advantage. However, we note above also how tacit knowledge is difficult to imitate, even when corresponding knowledge flows are encouraged by management within a single organization. This sticky nature of tacit knowledge is thus a mixed blessing. On the one hand it supports competitive advantage, but on the other it restricts knowledge flows within one's own organization.

To emphasize this important point, consider an organization that develops a knowledge-based competitive advantage through the learning and application of an exceptional team of people in one particular plant, regional office or product line. This organization would seek naturally to exploit such advantage and to capitalize on its knowledge differential over competitors. Keeping this exceptional team of people together and preventing defections to rival organizations represent two objectives management is likely to pursue to prevent knowledge from flowing out of its prize unit.

Capabilities based on the tacit knowledge enabling this organization's competitive advantage will be difficult for competitors to imitate. This contributes toward sustainability of its knowledge-based advantage, but at the same time, this organization seeks to leverage such advantage by transferring key knowledge from its prize unit to other plants, regional offices and product lines. The same attributes of tacit knowledge that make it difficult for competitors to imitate knowledge-based capabilities make it difficult also for other parts of the same organization to imitate. Such organization seeks methods and technologies to promote knowledge flows internally yet prohibit such knowledge from leaking externally. This represents a challenging problem of harnessing dynamic knowledge.

A case study of one successful automobile company in Europe (Loch, Pich, Terwiesch & Urbschat 2001) illustrates in part this difficulty of promoting internal knowledge flows. The company developed and implemented an effective means of improving research and development (R&D) decision-making through the use of mathematical programming techniques. Despite demonstrating performance benefits of such techniques within the adopting unit, however, the company had little success in terms of diffusing the approach through other units within the firm. The manager responsible for the original advance had contracted with academic consultants who were external to the company. Although this manager understood the benefits and overall approach of mathematical programming, he did not possess the detailed expertise to implement it in his unit of the company or in other units. Hence the company failed to appropriate the mathematical programming knowledge. Rather, it remained dependent upon external consultants. When such consultants were not retained by the company to extend the decision-making techniques into other units, the corresponding knowledge and expertise left the company along with the consultants. Knowledge flows associated with the mathematical programming techniques ceased then.

It is important to note, the objective of promoting knowledge flows internally within organizations is not restricted to select knowledge that enables competitive advantage. All knowledge required for an organization to perform its work processes and accomplish its mission needs to flow within such organization. Knowledge lies always on the critical path of work; that is, people must know how to accomplish a job before they can accomplish it, and they must know how and when to accomplish it well—generally in conjunction with others—before contributing to competitive advantage. Hence even routine knowledge necessary to perform ordinary work processes within an organization must flow across numerous dimensions.

For instance, we note above how knowledge flows between different organizational units are desirable where such knowledge enables competitive advantage. Inter-unit knowledge flows are important also for organizations that seek to maintain consistent work processes, technological environments and product quality levels across units. Whether the products of interest are semiconductors, pharmaceuticals, software applications or government services, knowledge is required to perform the corresponding work processes, and such knowledge must flow between units to ensure consistent performance organization-wide. The case of the automobile company above illustrates well how failure of inter-unit knowledge flows can prevent some units within a single firm from enjoying even benefits demonstrated in other units.

As another instance, knowledge flows across time are necessary also, in addition to flows across different organizations and geographical regions. Consider where one shift replaces another in a factory, processing plant or military watch. Management is interested in using the knowledge gained during a shift by one group to enhance the performance of the other group. Take a network problem, for example, in a global telecommunications firm. Such firms operate 24 hours a day, yet individual employees work generally only eight hours at a time. When an individual cus-

tomer service agent leaves at the end of a shift, it is important for him or her to convey what he or she knows about the network problem to the person taking over. Otherwise, the agent beginning a new shift may not understand adequately the network status to relate effectively with customers or to steer them toward work-around solutions to network problems. Similar examples in other settings (e.g., plant equipment problems in a petroleum-processing operation, health problems of a patient in a hospital intensive-care unit, intentions of commercial aircraft in flight as air traffic controllers change shifts) abound as well. Notice, such knowledge flows—across shift changes—represent dynamics occurring over relatively short periods of time (e.g., hours).

Alternatively, other flows require knowledge to move over extended periods of time. Consider how most organizations expect junior members to develop knowledge and expertise over time. Some aspects of knowledge and expertise can be acquired directly (e.g., through education and training programs), whereas others accumulate indirectly through experience (e.g., working on a particular kind of problem). Some kinds of knowledge are quite general and transferable broadly (e.g., engineering principles and methods), whereas others are specific to a particular company, department and work assignment, and hence more restricted in terms of opportunities for application and transfer. In some cases people can begin at a state of ignorance and incompetence yet develop knowledge and expertise through a process of repeated trial and error (e.g., on-the-job training or OJT), whereas other work contexts require competent performance on the first attempt (e.g., surgery). In still other situations knowledge and expertise apply to individuals (e.g., the examples above), whereas group, team and department interaction requires collections of people to learn how to work together (e.g., basketball teams, software development groups, police SWAT teams).

In every case, considerable time is required for learning (i.e., knowledge to flow). The amount of time allocated for learning represents a management decision. In the typical research university, for example, assistant professors are given six years to establish a positive national reputation, after which they face an up-or-out staffing decision, but the kinds of work they perform (e.g., research, instruction) remain the same for the most part throughout this period (and in many cases for years or even decades beyond). Most research universities have decided that six years of the same work after earning a PhD is enough time to become an associate professor. In a corporate employee-internship program, as a different example, new college hires may be rotated through different departments and jobs every six months. Unlike the research university, here the kinds of work new hires perform change with each rotation. Such organizations have decided that six months of the same work after earning a college degree is enough time for rotation to another job. The US Navy, as a third example in between the two above, rotates its personnel roughly every two or three years. Here all of its people (e.g., junior and senior, enlisted and officers, sailors and staff) change jobs on two- or three-year intervals. This military organization has decided that two or three years of the same work after assignment to a new command is enough time for rotation to another job.

Knowledge flows between people denote a related instance. Of course this transcends the other instances above, for ultimately nearly all tacit knowledge flows in an organizational context take place within individuals and between people. In the case of inter-unit transfers, people in the different organizations must learn from one another (e.g., about decision-making techniques). In the case of flows between shifts, people on the different shifts must learn from one another (e.g., about equipment problems). In the case of new employees, people must learn from some combination of the work itself (e.g., trial and error, OJT) and other people (e.g., supervisors, mentors, instructors, peers). Hence knowledge flows across different organi-

zational units, geographical regions and points in time involve people and are necessary just to accomplish the work at hand (e.g., ordinary work processes), even where such knowledge may not necessarily lead to competitive advantage. This elucidates a critical point in terms of diagnosing knowledge-flow problems. Viewed in reverse, where knowledge fails to flow well, even to enable ordinary workflows, the organization may experience competitive disadvantage, as it fails to perform even its routine work effectively.

Consider the Business Process Re-engineering (BPR) movement in the Nineties, for instance. Conceived originally as an approach for radical change to effect dramatic performance improvements in organizations (Davenport, 1993; Hammer & Champy, 1993), BPR provided a broad-based impetus and set of techniques to enable organizations to perform better with fewer assets. However, the focus of this approach shifted over time from one of superior performance to a cost-cutting mechanism. Profits rose at many companies, and competitors followed suit to avoid being left behind, but in the US alone many tens of thousands of jobs were eliminated through the process. Many of these jobs belonged to knowledge workers and middle managers. After some period of time, it became apparent to several firms that critical organizational knowledge had left the company with the people who were "downsized." Such people had to be rehired—oftentimes as expensive consultants or for far more than their previous salaries. The short-term focus on cost-reduction and job-elimination took place at the expense of longer-term performance and knowledge accumulation.

A similar situation is occurring at the time of this writing for a different reason. A large number of people from the Baby Boom Generation are retiring. Organizations lack the resources and techniques to ensure that Baby Boomer knowledge flows effectively to the Generation X, Y, Millennial, and other groups that are performing junior- and mid-level jobs in such organizations. Indeed, the US Government estimated nearly a decade ago that half of its workforce would be eligible for retirement today (Liebowitz, 2004). This estimate remains relatively accurate (OPM, 2008), yet despite such forewarning, the massive governmental organization remains perplexed regarding how to preserve the corresponding knowledge. This applies in particular to the kind of rich, experience-based tacit knowledge that makes seasoned employees so valuable.

Even within a particular organization, knowledge can be observed to clump noticeably in certain people, groups, locations and points in time. The phenomenon of knowledge distributing itself unevenly across different people has been studied extensively for years (e.g., see Turban & Aronson, 1998). Researchers have examined the nature of expert performance and tried to draw generalizable comparisons with the performance of novices, for instance. Many studies of leadership fall into this category. A whole industry of expert systems was developed in the Eighties around the idea of capturing expert level capabilities and formalizing them in computers. Indeed, knowledgeable people have been painting caves, chiseling stones and writing books for millennia in attempts to share their expertise, and Society has developed many other techniques for experts (and novices) to share knowledge (e.g., stories, mentoring, apprenticeship, university courses, webinars, YouTube videos).

Since expert knowledge is tacit generally, it is sticky, and the corresponding clumps remain difficult to distribute. For instance, it is recognized widely that roughly ten years' sustained and dedicated effort is required to become an expert in a particular field, with accumulation of some 10,000 chunks of knowledge corresponding (Turban & Aronson, 1998). Trying to share such expertise encounters the well-understood problem associated with "the fish." Recall the parable of giving someone a fish versus teaching him or her how to fish. In the former case, one feeds the person for a day, but he or she becomes hungry again

the following day. In the latter case, the person learns to feed him or herself for a lifetime, but such learning takes time. Ask an expert to solve a problem, and he or she solves the problem. This takes care of the situation until its next occurrence. Now ask the expert to teach an apprentice how to solve the problem. The expert (or simply more knowledgeable person) must be willing and able to share; the novice must be willing and able to learn; and the organization must be willing and able to help them do so. Very few organizations accomplish such individual learning well at present. As a general rule, individual knowledge does not flow well through most organizations.

Even more difficult is enabling knowledge flows at other levels. Because groups, teams, departments, firms and even larger aggregations of people, for instance, are comprised of individuals, all of the same individual-level problems noted above are present within such organizations. In addition, knowledge is noted to clump in certain organizations as well as specific individuals. Accounts abound of groups, teams, offices, units, ships, crews, organizations and like aggregations of people that are practically identical except for the individuals comprising them, yet in which one outperforms the others, oftentimes consistently and dramatically so. Identifying the sources of performance differences between apparently equivalent organizations is difficult enough, even though it reduces often to some kind of tacit knowledge that is shared within a particular group. Nonetheless, conceiving mechanisms for such shared knowledge to flow between two groups remains very challenging. Because the shared knowledge is tacit, attempting to write it down and disseminate it via books, standard operating procedures, lessons learned, Web portals, workflow systems, wikis, social networking sites, and other approaches relying upon explicit knowledge offers limited efficacy potential. Reading knowledge that has been written down is not the same as learning it tacitly.

This same point pertains to enterprises that are separated across time and space, as well as those separated by organizational boundaries. Think of a new group taking over a work task from a group that has been performing it effectively for some time, or an organization in one geographical region that is able somehow to perform more effectively than its equivalent counterpart in another region. Knowledge flows are essential for power through competitive advantage, but enabling such flows remains a huge challenge for most organizations.

KEY INSIGHTS

Five key insights developed in this chapter help to shed metaphorical light on harnessing knowledge power for competitive advantage: 1) knowledge is distinct from information; 2) knowledge is distributed unevenly, and hence must flow; 3) tacit knowledge supports greater appropriability than explicit knowledge does; 4) knowledge flows must balance exploration with exploitation; and 5) enhancing knowledge flows requires simultaneous attention to people, processes, organizations and technologies.

Insight 1

First, distinguishing knowledge from information is important. One effective operationalization is, knowledge enables direct action (e.g., correct decisions, appropriate behaviors, useful work), whereas information provides meaning and context for such action (e.g., decision criteria, behavior norms, work specifications). As a Gedanken experiment, consider two people tasked to perform a knowledge-intensive activity. These could be captains on the bridge of a ship, surgeons at the operating table, managers at the negotiating table, professors in a classroom, attorneys in a courtroom, or many like situations requiring knowledge. Provide these two people

with exactly the same information (e.g., books to read, charts and reports to reference, instruments to monitor, direct views and sounds, advisors to consult, others), but say that one person has twenty years' experience, whereas the other has much less experience (or possibly none). Most informed leaders, managers and scholars would expect differential performance from these two people. Such differential performance can be attributed generally to differences in knowledge. Hence shuttling information around via computers, networks, reports and communications does not address the flow of knowledge, at least not directly or on the same time scale.

Insight 2

Second, knowledge clumps in particular people, organizations, regions and times of application. Knowledge power through competitive advantage requires knowledge to flow, but tacit knowledge in particular is sticky, difficult to acquire, and slow to move. This same property, which enables knowledge-based competitive advantage to be sustainable, inhibits simultaneously sharing within the organization. Hence knowledge clumps need to be identified, and knowledge flows need to be enabled through the organization without allowing them to leak externally.

Insight 3

This gives rise to a third Insight, which is focused on differentiating between different kinds of knowledge. In particular, explicit knowledge that can be articulated (e.g., via books, graphs, videos, software) is distinct in many ways from the kind of tacit knowledge that accumulates, often slowly, through direct experience. Neither is individual expertise quite the same as knowledge shared across members of a group, team or other organization. Knowledge can also be quite situated, ephemeral and local, meaning a person on the "front lines" cannot always communicate the richness of what he or she knows to someone at headquarters. Yet people at headquarters tend to demand abundant information flows to support decision-making that is often made better on location. Of course, the person on the scene with detailed and local knowledge often lacks the high-level integrative understanding of managers at headquarters, and the need for functional specialists to share specific knowledge for complex problem solving is known well. Nonetheless, central to the point of power, tacit knowledge supports greater appropriability than explicit knowledge does. Hence organizational leaders and managers may benefit from an emphasis on tacit—in addition to explicit—knowledge flows.

Insight 4

Fourth, not all knowledge—not even tacit knowledge—is of equal value, nor does knowledge need to be shared in order to effect high performance. Indeed, there is a classic tension between exploration and exploitation in terms of organizational learning (March, 1991). Because resources such as time, energy and attention are limited, investing in exploration of new knowledge and opportunities limits necessarily the resources available to exploit the knowledge and opportunities that exist, and vice versa. Further, to the extent that an organization focuses solely on exploitation, for instance, it can quickly develop competency traps (Levitt & March, 1988) and suffer from debilitations associated with single-loop learning (Argyris & Schon, 1978); that is, an organization can learn to do the wrong thing very well and not realize that its competency is no longer suited well to the environment. Likewise, to the extent that an organization focuses solely on exploration, as a contrasting instance, it can quickly see its demise, as competitors capitalize upon current opportunities and take advantage of the organization's time away from task; that is, the organization can prepare itself well for a future environment but fail to survive until such future arrives. Similar

tensions arise between learning and doing, sharing and hoarding knowledge, acquiring general versus specialized expertise, and like knowledge-oriented tradeoffs. Hence understanding the kinds of knowledge that are important in an organization's particular environment is essential for promoting the most important knowledge flows.

Insight 5

Fifth, it is known well that organizational personnel, work processes, structures and technologies are interconnected tightly and interact closely (Leavitt, 1965). When seeking to redesign and change organizations to identify knowledge clumps and to enhance knowledge flows, it is important to focus simultaneously on all of these interconnected and interacting elements, together. Most people can identify quickly a technological "innovation" that failed to produce favorable results when implemented in an organization, for instance. Bringing in people or teams with different backgrounds in terms of education, training, skills, culture and experience represents a similar instance (e.g., conjuring up memories of failed implementation), as does changing work processes or organizational reporting relationships and responsibilities without addressing personnel and technologies. Hence the elements people, processes, organizations and technologies operate as a cohesive system and should be addressed as an integrated design problem.

CONCLUSION

A great many organizations rely upon advancing information technology in their quests for competitive advantage. The problem is, so long as competitive advantage is based on IT and like resources that are obtainable or substitutable by competing organizations, it is likely to be ephemeral at best. Alternatively, competitive advantage enabled by tacit knowledge is comparatively much more sustainable, but such knowledge tends to be sticky and does not flow well through the organization. Hence the power of tacit knowledge is great in terms of enabling and particularly sustaining competitive advantage, but the corresponding dynamics can make it difficult to capitalize upon effectively. This chapter focuses specifically on how the power of dynamic knowledge can be harnessed for competitive advantage.

We first examine in some detail how different kinds of knowledge and other organizational resources enable competitive advantage. Traditional economic inputs such as land, labor and capital have long been used to obtain competitive advantage, but where competitors can obtain the same or substitutable assets, such advantage is likely to be ephemeral. Likewise with IT, and even information or knowledge made explicit, it must be protected vigilantly in order to preserve any competitive advantage that may obtain.

Competitive advantage based upon tacit knowledge is different, however. The corresponding knowledge-based performance is more appropriable generally and inimitable often, which suggests that competitors may find it very difficult to match performance levels. Hence such competitive advantage offers much greater potential to be sustained over time. Traditional economic inputs, IT, information and explicit knowledge remain very important, of course, but organizational leaders and managers may benefit greatly by emphasizing tacit knowledge for competition.

We then discuss the dynamics of knowledge, looking in particular at how it flows through the organization. We find that the dynamics of tacit knowledge make it a metaphorical two-edge sword: it is difficult for competitors to imitate organizational performance based upon tacit knowledge, but it is difficult likewise for organizations to share such knowledge internally. This pertains to knowledge flowing across different people (e.g., experts), organizations (e.g., business units), places (e.g., branches) or times (e.g., across shifts). Although it flows comparatively

slowly, tacit knowledge can be learned, and the amount of time allocated—invested really—to learning new knowledge (e.g., via OJT, job rotation, mentoring, training, education) represents an important management decision. Even in the case of ordinary workflows with little potential to enable competitive advantage, the failure of enabling knowledge to flow well can cause an organization to experience competitive disadvantage (e.g., if fails to perform routine work effectively). This can stem from management neglect as well as cost-cutting actions, but it can occur quite naturally also as aging workers retire. In the current case of Baby Boomers, their huge representation in the workforce is causing many organizations today to face enormous losses of rich, experience-based tacit knowledge, and few such organizations appear to be equipped well to stem, counter or otherwise compensate for such losses.

The chapter concludes with five key insights for use and application: 1) knowledge is distinct from information; 2) knowledge is distributed unevenly, and hence must flow; 3) tacit knowledge supports greater appropriability than explicit knowledge does; 4) knowledge flows must balance exploration with exploitation; and 5) enhancing knowledge flows requires simultaneous attention to people, processes, organizations and technologies. Such insights focus specifically on knowledge and its role in enabling and sustaining competitive advantage. These insights are broadly applicable and ripe for generalization into principles that can be harnessed. For instance, the organization understanding how knowledge differs from information may begin to view its IT investments in new light; since any competitive advantage conferred through IT is likely to be ephemeral, an increased—yet balanced—investment allocation in people, processes and organizations, in addition to technology, may prove wise over time.

Such insights are also actionable and can be used to support management decision making. For instance, understanding the uneven distribution of knowledge and the importance of it flowing smoothly through an organization can be acted upon daily. In addition to focusing and relying upon the levels or stocks of knowledge (i.e., a relatively static view) in various people and parts of the organization, leaders and managers may find it useful to also consider and emphasize the movements or flows of such knowledge (i.e., a comparatively dynamic view). This could affect hiring, staffing, educating, training, mentoring, organizing, alliancing and like, key decisions made daily in most organizations.

Finally, such insights can help to orient continued research as well. For instance, understanding how tacit knowledge supports greater appropriability than explicit knowledge does can help to focus research on the comparative costs and benefits associated with investments in tacit versus explicit knowledge. Where the power of tacit knowledge is sufficiently great, with respect to that of explicit knowledge, to offset the comparative difficulty associated with getting such tacit knowledge to flow through an organization, leaders and managers should devote correspondingly greater time, energy, attention and money toward promoting tacit knowledge flows, and vice versa. However, a dearth of research addresses such key topics as measuring knowledge power, comparing the relative costs of investments focused on tacit versus explicit knowledge, identifying means to accelerate tacit knowledge flows, and others with potential to enrich management capability and potentially alter the nature and sustainability of competitive advantage. These and like topics comprise an exciting research stream, and we encourage others to help find solutions to the perplexing problems that result.

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KEY TERMS AND DEFINITIONS

Competitive Advantage: Outperforming an organization's competitors.

Ephemeral Competitive Advantage: Competitive advantage that cannot be sustained over time.

Explicit Knowledge: Knowledge that has been articulated.

Knowledge: An enabler of action.

Knowledge Flow: Movement of knowledge.

Knowledge Power: Efficacy of knowledge-based action.

Sustainable Competitive Advantage: Competitive advantage that can be sustained over time.

Tacit Knowledge: Knowledge that has not been articulated.